

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0880	TPA CHANGE NOTICE FORM	Date: 12/16/19
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Document Number, Title, and Revision: DOE/RL-2014-34, <i>Action Memorandum for 200-DV-1 Operable Unit Perched Water Pumping/Pore Water Extraction, Rev. 0</i>	Date Document Last Issued: December, 2014
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Approved Change Notices Against this Document: N/A

Originator: Mark E. Byrnes	Phone: 509-373-3996
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Description of Change:
Changes are required to the 200-DV-1 action memorandum (DOE/RL-2014-34, Rev. 0) to incorporate eight new extraction wells and four new monitoring wells.

 M. W. Cline and D. Goswami agree that the proposed change
DOE **Lead Regulatory Agency**
 modifies an approved workplan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records*, and not Chapter 12.0, *Changes to the Agreement*.

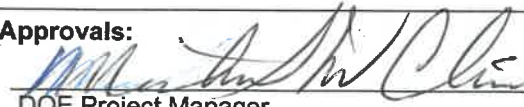
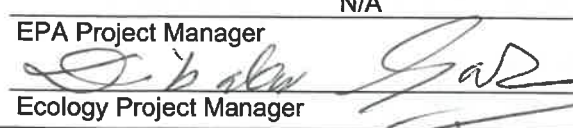
Revised pages 8, 15, and 16 to add "with the exception of nitrate, for the duration of the 200-ZP-1 optimization study plan (DOE/RL-2019-38)."
 Revised section 5 on page 12 to indicate a minimum of three extraction wells may be used to extract perched water.
 Revised sections 5.2.2 and 5.2.3 on page 13 to indicate a minimum of three extraction wells may be used to extract perched water.
 Revised the Executive Summary and Page 18 to add information about the 200 West Operations and Maintenance Plan (DOE/RL-2009-124) and the 200-ZP-1 Optimization Study Plan (DOE/RL-2019-38).
 Additions are shown using double underline. Deletions are shown using ~~strikeout~~.

Note: Include affected page number(s): vii, 8, 12, 13, 15, 16, and 18.

Justification and Impacts of Change:

The new monitoring wells and additional extraction wells in the 200-DV-1 OU perched water zone will support the non-time-critical removal action (NTCRA) by increasing the perched water extraction rate and also collecting information to evaluate remediation alternatives within and surrounding the perched water zone for protection of groundwater. The information gathered will also be used to refine the conceptual site model (CSM) for the perched water zone and the vadose zone above and below the perched water zone with respect to its size, contaminant distribution, and properties related to the effectiveness of water extraction and other potential remedies. The actual schedule for installation, construction, and operation of the extraction and monitoring wells will be determined based on priority of Hanford Site work activities and available funding each FY.

Approvals:

 DOE Project Manager	12/16/2019 Date	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved
N/A	Date	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved
 Ecology Project Manager	12/16/19 Date	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved

Executive Summary

This action memorandum (AM) documents the selected alternative for remediating perched water in the 200-DV-1 (deep vadose zone) Operable Unit (OU) within the Hanford 200 Area National Priorities List¹ (NPL) site. The preparation of this AM was in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*,² as amended by the *Superfund Amendments and Reauthorization Act of 1986*,³ and the “National Oil and Hazardous Substances Pollution Contingency Plan” (40 CFR 300).⁴

The removal action supports the overall cleanup objectives in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement),⁵ as revised. This non-time-critical removal action (NTCRA) is described herein for the 200-DV-1 OU perched water. Without this removal action, contaminated perched water could adversely impact human health and the environment (HHE).

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency, and Washington State Department of Ecology (collectively referred to as the Tri-Parties) considered three alternatives for remediating the 200-DV-1 OU perched water under an NTCRA: (1) a legally required No Action alternative, (2) extraction of perched water with treatment at the Effluent Treatment Facility, and (3) extraction of perched water with treatment at the 200 West pump and treat (P&T).

Alternative 3 is selected for this NTCRA. This alternative extracts perched water from the 200-DV-1 OU and transfers the water by tanker truck or pipeline to the 200 West P&T, where it is treated and injected into the aquifer below the 200 West Area.

¹ 40 CFR 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” Appendix B, “National Priorities List,” *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=ece2bdf6b31758fe41fead1616c7aa4&node=ap40.28.300_11105.b&rqn=div9.

² *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: <http://epw.senate.gov/cercla.pdf>.

³ *Superfund Amendments and Reauthorization Act of 1986*, 42 USC 103, et seq. Available at: <http://epw.senate.gov/sara.pdf>.

⁴ 40 CFR 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=676ed515025056babbc121c6f0398639&tpl=/ecfrbrowse/Title40/40cfr300_main_02.tpl.

⁵ Ecology, EPA, and DOE, 1989a, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: <http://www.hanford.gov/?page=81>.

The 200 West Pump and Treat Facility is operated in accordance with the 200-ZP-1 Pump and Treat Facility Operations and Maintenance Plan (DOE/RL-2009-124) and the 200-ZP-1 Optimization Study Plan (DOE/RL-2019-38) for the duration of the optimization study.

Contaminant sources addressed by this AM include both radioactive and chemical hazardous substances (Table 1). The perched water contains contaminants of concern (COCs) (uranium, technetium-99, nitrate, total chromium, hexavalent chromium, and tritium) at concentrations that exceed the MCLs and represent the primary risk to the underlying groundwater and HHE. The COCs established for this removal action apply to water removed from the perched water zone for treatment and not to the perched water layer remaining in the deep vadose zone. Table 1 provides the measured ranges of concentrations for the COCs plus other radioactive and nonradioactive constituents in perched water samples from well 299-E33-344. These additional constituents were determined not to pose an impact to the 200 West P&T. The COCs, with the exception of tritium, will be treated at the 200 West P&T to below MCLs, with the exception of nitrate for the duration of the 200-ZP-1 optimization plan study (DOE/RL-2019-38), to meet the injection criteria. There is no treatment method for tritium, but the resulting combined discharge concentration from the 200 West P&T is expected to be below the MCL for tritium.

The perched zone is a transient perching layer where current or recent rates of water infiltrating through the vadose zone exceed the rate at which water moves through the silt layer, resulting in the buildup of water on top of the silt layer. The contaminated water built up on the perching layer slowly migrates downward and contaminates the 200-BP-5 OU. Distributions of uranium, technetium-99, and nitrate in groundwater near the 200-DV-1 OU perched water area for 2012 are shown in Figures 4, 5, and 6, respectively. These three contaminants, which are found in the perched water and the groundwater, are a threat to HHE.

4 Endangerment Determination

Actual and threatened releases of hazardous substances from the 200-DV-1 OU perched water to the 200-BP-5 OU aquifer and their migration present an imminent and substantial endangerment to public health or welfare or the environment.

Security controls, including administrative and physical access controls, are currently in place to limit unauthorized entry to the Hanford Site. Only authorized personnel are allowed entry into areas where hazards exist. As long as DOE retains control of these areas, institutional controls (ICs) prevent direct contact with and exposure to hazardous substances. However, ICs do not prevent the continuing migration of contaminated perched water to the 200-BP-5 OU aquifer.

Contamination of the groundwater addressed by this AM justified the use of CERCLA removal action authority in accordance with the NCP (40 CFR 300.415, "Removal Action"). DOE Order 5400.4, *Comprehensive Environmental Response, Compensation and Liability Act Requirements*, requires that the response to any release or substantial threat of a release of a hazardous substance into the environment be in a manner consistent with CERCLA and the NCP, regardless of whether the release or threatened release is from a site listed in the NCP (40 CFR 300, Appendix B, "National Priorities List" [NPL]). DOE will use CERCLA response authority to conduct necessary response actions to protect public health, welfare, and the environment.

5 Proposed Actions and Estimated Costs

The removal action proposed in the EE/CA will extract contaminated perched water from the 200-DV-1 OU and treat it at the 200 West P&T. The perched water will be removed from a minimum of three up to three extraction wells, using gravity to drain the contaminated water into the wells. The water will be pumped to containers on the ground surface. The need for implementing vacuum-enhanced recovery of perched water and pore water extraction will be evaluated as the removal action is conducted. The contaminated perched water will be transferred to the 200 West P&T by tanker truck or by pipeline, once a pipeline is constructed. The 200 West P&T will treat the contaminated water to below MCLs, with the exception of nitrate, for the duration of the 200-ZP-1 optimization study plan (DOE/RL-2019-38) and then inject the treated water into the underlying aquifer.

The proposed removal action mitigates the migration of contaminants to the underlying 200-BP-5 OU aquifer. The proposed removal action is the most cost-effective alternative that reduces long-term risk to HHE. The proposed removal action is consistent with and a contributor to the efficient performance of Hanford Site long-term remedial actions. The results from implementing this removal action will be used to support 200-DV-1 OU and 200-BP-5 OU remedial investigations.

The proposed removal action and alternative actions for treating the contaminated perched water extracted from the 200-DV-1 OU were identified and evaluated in terms of their effectiveness, implementability, and cost in the EE/CA. The EE/CA and responses to public comments on the EE/CA are available in the Administrative Record.

This chapter summarizes the proposed and alternative actions and the estimated costs.

5.1 Removal Action Objectives

The removal action objectives (RAOs) are as follows (not ranked or prioritized in a particular order):

- Apply ICs to protect human receptors from exposure to contaminants that exceed MCLs in the underlying aquifer.
- Control sources of groundwater contamination.
- Remove contaminant mass from perched water and support final remedial options for both the 200-DV-1 and 200-BP-5 OUs.

The first RAO listed above has been modified slightly from that identified in the EE/CA to clarify that it applies only to human receptors, and that contaminant levels will be compared to drinking water MCLs as opposed to risk levels. The human health protection described in the first RAO in the EE/CA is provided for by the use of ICs. The first and fourth RAOs in the EE/CA were combined in the first RAO listed above. The *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions and RCRA Corrective Actions* (DOE/RL-2001-41) describes how the ICs are applied across the Hanford Site. For this removal action, ICs associated with denial of public access and the drilling of groundwater wells would apply.

The proposed removal action controls sources of groundwater contamination and removes contaminant mass from the perched water by pumping the contaminated water from the perched layer and treating it at the 200 West P&T to below MCLs, with the exception of nitrate, for the duration of the 200-ZP-1 optimization study plan (DOE/RL-2019-38) in order to meet injection criteria.

The removal action for the perched water is protective of HHE and meets RAOs.

5.2 Alternatives Evaluated in the Engineering Evaluation/Cost Analysis

The Tri-Parties considered three removal action alternatives for treating the perched water in the 200-DV-1 OU: (1) a legally required No Action alternative, (2) extraction of perched water with treatment at the ETF, and (3) extraction of perched water with treatment at the 200 West P&T. The EE/CA documents the identification and evaluation of the alternatives. The removal action recommended in the EE/CA is Alternative 3.

5.2.1 Alternative 1 – No Action

Alternative 1 provides a baseline for comparison to the other alternatives. Under this alternative, it is assumed that the perched water would be abandoned without any further actions. All current activities would be discontinued indefinitely. No legal restrictions, ICs, or active measures would be applied to the perched water zone. Initial risks are minimal, but over time, the risks are anticipated to increase as the perched water migrates to groundwater and then potentially to receptors. This alternative is not protective of HHE.

5.2.2 Alternative 2 – Treatment at the Effluent Treatment Facility

Alternative 2 is similar to the existing treatability test. Under Alternative 2, water would be extracted from the 200-DV-1 OU perched layer and transferred by tanker truck to the ETF in the 200 East Area, where the water would be treated and injected into the aquifer. Perched water would be extracted using gravity drainage into a minimum of three~~up to three~~ extraction wells, with subsequent pumping to the surface to containers. The extraction would initially be from the existing perched water well (299-E33-344), with an expected recovery of approximately 380,000 L/yr (100,000 gal/yr), extracted at a rate of 0.722 L/min (0.19 gallons per minute [gpm]). Two additional perched water wells (299-E33-350 and 299-E33-351) would increase the extraction rate to approximately 2.16 L/min (0.57 gpm). The gravity drainage and pumping would continue until the yield decreases. At that time, a vacuum would be applied to the extraction system to increase flow to the wells. Once the perched zone is in a mostly unsaturated condition, a higher vacuum would be applied to induce pore water extraction. The extracted water would be transported by tanker truck to the ETF for treatment and disposal. The treated liquid waste from the ETF would be discharged to the State-Approved Land Disposal Site in the 200 West Area. The ETF has determined that both extracted perched water and the contaminants can be accepted and treated at the facility. At the time that the treatability test plan was written, the ETF represented the most technically sound and cost-effective approach for treating and disposing perched water from the 200-DV-1 OU.

Alternative 2 is protective of HHE, effective, and implementable, but treatment at the ETF is no longer the most cost-effective approach.

5.2.3 Alternative 3 – Treatment at the 200 West Pump and Treat

Alternative 3 would extract contaminated water from the 200-DV-1 OU perched layer using the same ~~three~~ wells and methodology described for Alternative 2. The phases of gravity drainage and pumping, enhanced-vacuum recovery, and pore water extraction described in Alternative 2 would also be included in Alternative 3. However, under Alternative 3, the extracted perched water would be transferred by tanker truck or pipeline to the 200 West P&T, where it would be treated and then injected into the aquifer below the 200 West Area. Figure 7 shows the locations of the 200 West P&T, the perched water layer in the 200 East Area, and the ETF in the 200 East Area.

In 1989, EPA listed the entire Hanford 200 Area as a single, new Superfund site on the NPL (40 CFR 300, Appendix B). In the Tri-Party Agreement (Ecology et al., 1989a), the Tri-Parties agreed, in "Article XVIII, Permits," that "...under CERCLA Sections 121(d), 121(e)(1) and the NCP, portions of the response actions called for by this Agreement and conducted entirely on the Hanford Site are exempted from the procedural requirements to obtain federal, state, or local permits, but must satisfy all the applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations which would have been included in any such permit."

The preamble to the NCP states that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4), "Response Authorities," allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. The 200-DV-1 OU perched water pumping/pore water extraction removal action purge well sites and the 200 West P&T (200-ZP-1 OU) are reasonably close to one another, and the wastes are compatible for the selected disposal approach. Therefore, these two sites are considered to be a single site for response purposes.

The preamble to the NCP states that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. The 200-DV-1 OU perched water pumping/pore water extraction removal action purge well sites and the Environmental Restoration Disposal Facility are reasonably close to one another, and the wastes are compatible for the selected disposal approach. Therefore, these two sites are considered to be a single site for response purposes.

The 200 West P&T was constructed in 2012 and designed for cleanup of the 200-ZP-1 OU in the 200 West Area. The 200 West P&T is designed to capture and treat contaminated groundwater in order to reduce the mass of carbon tetrachloride, total chromium (trivalent and hexavalent), nitrate, trichloroethene, iodine-129, and technetium-99. The system design also includes provisions for future treatment of groundwater from the 200-UP-1 OU, including the removal of uranium. It is expected that the uranium treatment capability will be installed at the 200 West P&T by mid-fiscal year (FY) 2015.

The initial treatment flow rate of the 200 West P&T is 9,464 L/min (2,500 gpm) of extracted groundwater. It was determined that the flow rate from perched water pumping can be accommodated by the 200 West P&T. An evaluation was performed to determine the capability of the 200 West P&T to meet treatment requirements for perched water. Based on calculations, the net increases in concentrations of uranium, technetium-99, nitrate, and other co-contaminants for two different feed-blending scenarios are within the design envelope for the 200 West P&T once the uranium ion-exchange system is installed. The concentrations of all constituents in the treated effluent are expected to be well below the MCLs, with the exception of nitrate, for the duration of the 200-ZP-1 optimization study plan (DOE/RL-2019-38).

Alternative 3 is protective of HHE, effective, and implementable, and it is the most cost-effective alternative. The EE/CA recommended Alternative 3, treatment at the 200 West P&T, as the preferred removal action for the perched water in the 200-DV-1 OU. The following sections provide information applicable to this alternative.

5.3 Compliance with Environmental Regulations, Including Those That Are Applicable or Relevant and Appropriate Requirements

CERCLA Section 121, “Cleanup Standards,” requires the responsible CERCLA implementing agency to ensure that the substantive standards of RCW 70.105, “Hazardous Waste Management”; the *Resource Conservation and Recovery Act of 1976*; and other applicable laws will be incorporated into the federal agency’s design and operation of its long-term remedial actions and into its more immediate removal actions. DOE is the implementing agency for this NTCRA. Ecology and EPA both concur that this NTCRA is warranted to protect HHE.

The NCP requires that the removal action described in this AM complies with ARARs to the extent practicable. The ARARs are substantive requirements of environmental standards incorporated in promulgated regulations that have been evaluated and determined to be pertinent to the removal action. Appendix A identifies and describes specific regulatory requirements that are ARARs for this removal action. To-be-considered (TBC) information is also included in Appendix A for this removal action. TBC information includes nonpromulgated advisories or guidance issued by federal or state governments; TBC information is not binding legally and does not have the status of ARARs.

The *Record of Decision, Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington* (EPA et al., 2008) and the *Record of Decision for Interim Remedial Action, Hanford 200 Area Superfund Site, 200-UP-1 Operable Unit* (EPA et al., 2012) establish ARARs for the injection of treated water from the 200 West P&T to the underlying aquifer. The extracted perched water will be mixed with water from the 200-ZP-1 OU and 200-UP-1 OU extraction wells at the 200 West P&T prior to treatment. The perched water COCs, with the exception of tritium and nitrate for the duration of the 200-ZP-1 optimization study plan (DOE/RL-2019-38), will be treated at the 200 West P&T to below MCLs. There is no treatment method for tritium, but the combined discharge concentration from the 200 West P&T is expected to be below the MCL for tritium. The perched water extracted from the 200-DV-1 OU perched water layer will comply with chemical-specific ARARs in the 200-ZP-1 OU ROD (EPA et al., 2008) and 200-UP-1 OU interim ROD (EPA et al., 2012) by meeting the treated effluent injection criteria for the 200 West P&T.

5.4 Compliance with Treatment Operating Range for the 200 West Pump and Treat

Extracted perched water will be transferred to the 200 West P&T. The perched water will be mixed with water from the 200-ZP-1 OU and 200-UP-1 OU extraction wells at the 200 West P&T prior to treatment. These mixed influent concentrations will be within the design envelope for the 200 West P&T once the uranium ion-exchange system is installed. The design envelope for the 200 West P&T is the contaminant concentrations expected at the influent of the 200 West P&T system. The expected influent concentrations for the 200 West P&T are provided in Table 3-3 of the *200 West Area 200-ZP-1 Pump-and-Treat Remedial Design/Remedial Action Work Plan* (DOE/RL-2008-78). The perched water extracted from the 200-DV-1 OU perched water layer will comply with the treatment operating range for the 200 West P&T by meeting the treatment operating envelope for the 200 West P&T. Periodic re-evaluation of the perched water will be performed as needed. The *200 West Pump and Treat Operations and Maintenance Plan* (DOE/RL-2009-124) will be modified to incorporate operational and monitoring changes based on receiving the 200-DV-1 OU perched water for treatment.

5.5 Project Costs

Cost estimates were evaluated for the three alternatives and were documented in the EE/CA. The estimates were prepared in accordance with *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002), in which the costs for the alternatives over time were

7 Statutory and Regulatory Authority

The proposed removal action is being undertaken by DOE as the lead agency pursuant to CERCLA Section 104(a) and Executive Order 12580, *Superfund Implementation*, as recognized by Section 7.2.4 of the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan) (Ecology et al., 1989b). In accordance with 40 CFR 300.415(j) and DOE guidance, onsite removal actions conducted under CERCLA are required to meet ARARs, to the extent practicable, considering the exigencies of the situation. DOE will comply with the ARARs set forth in Appendix A.

8 Outstanding Policy Issues

There is no outstanding policy issue associated with this NTCRA.

9 Enforcement

DOE is conducting this removal action as the lead agency under the authority of 40 CFR 300.5, "Definitions," and 40 CFR 300.415(b)(1).

10 Recommendations

This AM documents the intent to implement the selected removal action (Alternative 3) for P&T of the contaminated perched water in the 200-DV-1 OU. This decision document has been developed in accordance with CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*, and is consistent with the NCP. The conditions of the perched water meet the criteria specified in 40 CFR 300.415(b)(2) of the NCP. The decision is based on the Administrative Record for the removal action.

The recommended removal action alternative identified in the EE/CA is Alternative 3, extraction of the perched water and treatment at the 200 West P&T. This alternative has been selected for implementation because it is the most cost-effective alternative that reduces long-term risk to HHE. DOE also considers Alternative 3 to be consistent with and a contributor to the efficient performance of Hanford Site long-term remedial actions. The 200 West Pump and Treat Facility is operated in accordance with the 200 West Operations and Maintenance Plan (DOE/RL-2009-124) and the 200-ZP-1 Optimization Study Plan (DOE/RL-2019-38) for the duration of the optimization study. Furthermore, this alternative promotes restoration of the environment, consistent with goals identified in the Tri-Party Agreement (Ecology et al., 1989a).

At the completion of the NTCRA, a completion report will be issued that provides summary information, including volume and concentration of perched water extracted, treatment results, and 200-BP-5 OU monitoring data.

11 References

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=676ed515025056babbc121c6f0398639&tpl=/ecfrbrowse/Title40/40cfr300_main_02.tpl.

40 CFR 300.5, "Definitions."

40 CFR 300.415, "Removal Action."

Appendix B, "National Priorities List."